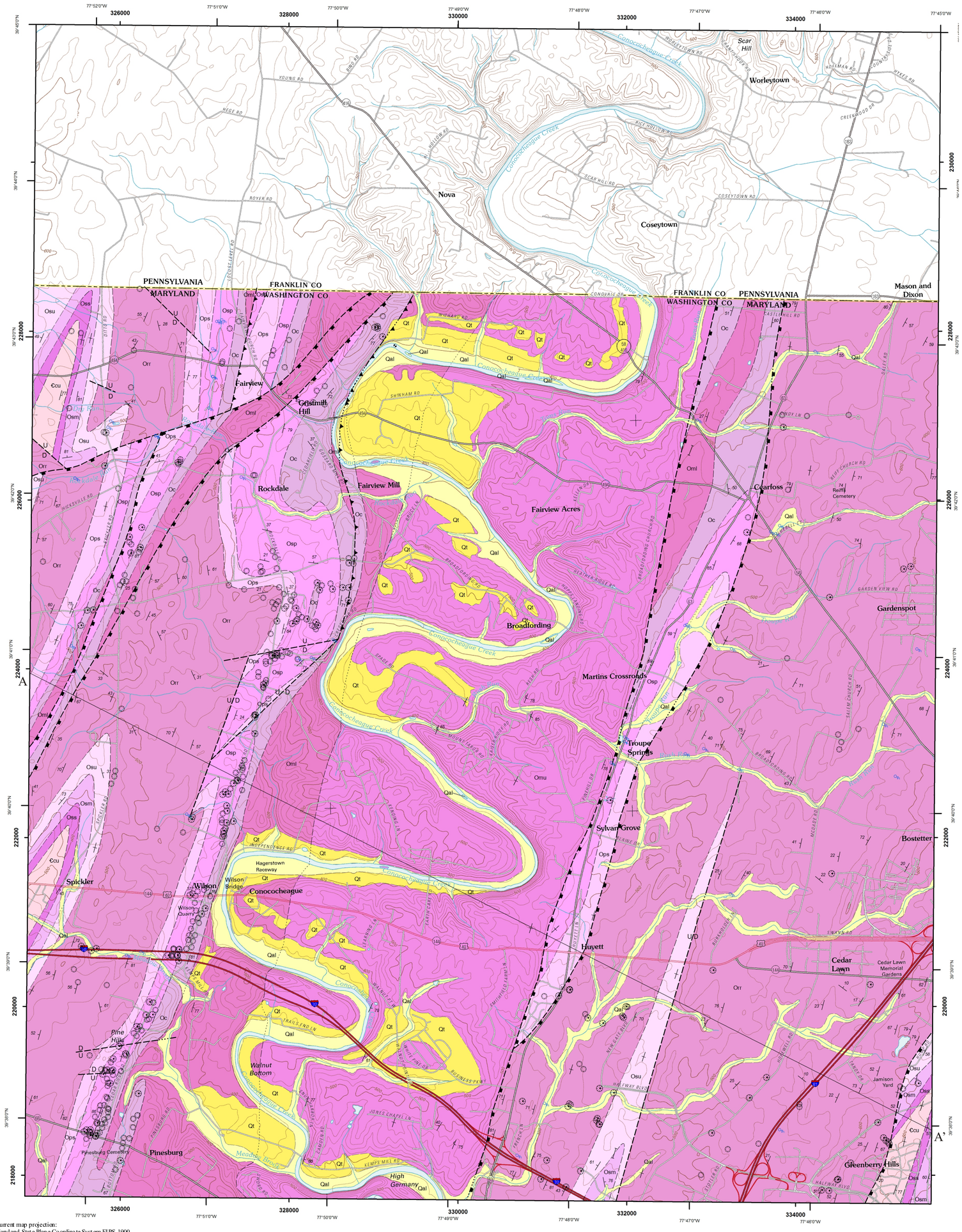


Current map projection:
Maryland State Plane Coordinate System FIPS 1900
(Projection: Lambert Conformal Conic, 1980 geodetic reference system)
(Horizontal Datum: North American Datum 1983)

MD State Plane 2,000-meter grid ticks and coordinates shown in black
Geographic coordinates (latitude-longitude)
Shown near corners and 1.0' intervals (in black)

U.S. Geological Survey (USGS) US Topo digital 7.5-minute Series
Mason-Dixon, MD-PA quadrangle, 2011
Hydrography derived from USGS National Hydrography Dataset, 2009
Topography generated from 1/3 arc-second National Elevation Dataset, 2000
Transportation from TeleAtlas Multinet Dataset, 2006-2010
Map published 2011 as a geoPDF document by USGS US TOPO,
conforms to US TOPO Product Standard 0.5.1 0

Reported magnetic north declination (center of Mason-Dixon quadrangle): 10.6° W
Estimated magnetic north declination (center of Mason-Dixon quadrangle): 10.61° W, changing by 0.01° W per year.)
To determine current magnetic declination see: http://www.ngdc.noaa.gov/geomag/declination.shtml)

Cultural features shown from USGS Geographic Names Information System
(GNIS) database, 2010

Geologic and Karst Features Map of the Mason-Dixon Quadrangle, Washington County, Maryland

By
David K. Brezinski
2013

GN
(State Plane Grid North)

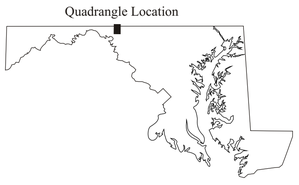
Adjoining 7.5-minute quadrangles
(Mason-Dixon quadrangle shaded)

1	2	3	1 Mercersburg 2 Williamson 3 Greencastle 4 Clear Spring 5 Hagerstown 6 Hedgesville 7 Williamsport 8 Funkstown
4		5	
6	7	8	

Scale 1:24 000
1 ½ 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0.5 0 1 KILOMETERS

Contour Interval 20 Feet
National Geodetic Vertical Datum of 1929
(To convert elevations to North American Vertical Datum of 1988, subtract 1 foot)
(To convert from feet to meters, multiply by 0.3048)

Quadrangle Location



Acknowledgements: This map partially funded by the Maryland State Highway Administration and the U. S. Geological Survey, National Cooperative Geologic Mapping Program, under USGS award number G12AC20414. The views and conclusions contained in this document are those of the author and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U. S. Government.

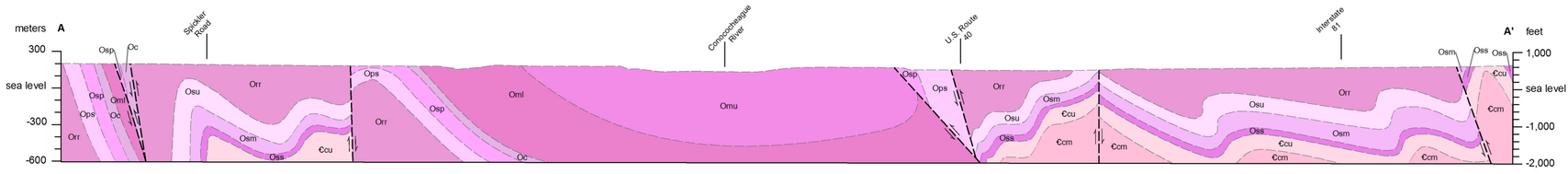
Geologic field mapping conducted in 2011-2013. The geologic map was compiled in digital form by Robert Conkwright of the Maryland Geological Survey.

The facilities and services of the Maryland Department of Natural Resources are available to all without regard to race, color, religion, sex, sexual orientation, age national origin or physical and mental disability.

Copies of this map downloadable in digital form from: MARYLAND GEOLOGICAL SURVEY http://www.mgs.md.gov/

Version: MASON2013.1
Released July 2013

Cross Section A to A′
(no vertical exaggeration)



DESCRIPTION OF MAP UNITS

Quaternary

Qal — Alluvium
Poorly sorted, unconsolidated, tan, reddish brown, to dark gray mud, silt, sand, and pebbles. Deposited within the channels of streams and on the flood plain adjacent to the streams. Thickness estimated at 3 to 10 feet (1to 3 m).

Qt — Terrace deposits
Reddish brown to brown, sandy and clayey mixture of rounded pebbles to cobbles of sandstone, vein quartz, and quartzite. Present along elevated areas above Conococheague Creek. Thickness ranges from a thin veneer to more than 10 feet (0 to 3 m).

Ordovician

Martinsburg Formation
Interbedded gray to greenish gray siltstone, tan sandstone, and gray to dark gray shale. Subdivided in the Mason-Dixon Quadrangle into lower and upper members.

Omu — Upper member
Medium gray shale interbedded with thin (0.5 feet, 15 cm) light gray to greenish gray, silty, graded sandstone. Grading upward into interbedded greenish gray to medium gray siltstone and silty shale with medium-to thick-bedded, medium- to coarse-grained sandstone. Thickness estimated at 2,000 to 3,000 feet (610–915 m).

Oml — Lower member
Predominately medium to dark gray, fissile shale with thin (<0.5 inches, 1 cm) siltstone interbeds. Dark gray to black shale at base equivalent to the Utica Shale. Thickness estimated at 1,500 to 2,000 feet (457–610 m).

Oc — Chambersburg Formation
Medium to dark gray, nodular- to medium-bedded, fossiliferous, fine-grained limestone. Nodular-bedded, shaly, highly fossiliferous limestone bearing the echinoderm, *Echinosphaerites*, occurs near the base of the formation. Top of the Chambersburg Formation is gradational with overlying Martinsburg Formation and consists of interbedded argillaceous limestone and grayish green shale. This interval is equivalent to the Stickley Run Member of the Martinsburg Formation of Virginia. Thickness is 250 feet (76 m).

Osp — St. Paul Group (undivided)
Massive, light gray, lime mudstone containing fenestral fabric (calcite filled voids) at the base (Row Park Limestone), overlain by interbedded, medium to light gray, medium-bedded limestone and laminated dolomitic limestone at the top (New Market Limestone). The thickness of the St. Paul Group is 300 feet (91 m).

Ops — Pinesburg Station Dolomite
Light gray to tan, medium-bedded, highly fractured, fine-grained dolomite. Weathers to a very light gray to buff surface. Interbedded with very light gray, laminated dolomite. Thickness is 350 to 400 feet (107–122 m).

Orr — Rockdale Run Formation
Interbedded and cyclic limestone and dolomite, cherty in the lower 400 feet (120 m). Limestone intervals consist of medium to light gray, ribbony and thrombolitic to stromatolitic, lime mudstone to boundstone. Locally, limestone layers are light gray oolitic packstone to oolitic grainstone. Dolomite parts of cycles vary from tan, laminated, to light gray to tan, massive, fractured with wispy dolomitic laminae. The relative proportion of the limestone to dolomite varies upsection. In the lower 600 feet (180 m), limestone is typically thicker than dolomite. This progressively changes upsection so that the upper 700 feet (215 m) is dominantly dolomitic with little limestone within individual cycles. Thickness is up to 2,500 feet (760 m).

Stonehenge Formation
The Stonehenge Formation was subdivided into three separate members. Only the lowest, the Stoufferstown Member, is named the other two are informal.

Osu — Upper member
Medium to medium dark gray, medium-bedded, ribbony and oolitic, lime mudstone to packstone. Near the base of the member ribbony lime mudstone predominates. Upsection, medium gray, ribbony lime mudstone becomes interbedded with intervals of flat-pebble lime grainstone, and hummocky, thickly-laminated lime packstone and oolitic lime packstone to grainstone. Locally, thin (< 3.0 feet, 0.9 m) algal thrombolites are present. This member commonly forms a persistent and mappable ridge and is frequently well-exposed. Thickness is 500 to 750 feet (150–215 m).

Osm — Middle member
Massive, medium to dark gray algal thrombolitic boundstone to ribbony limestone in the lower part. Some strata are up to 25 feet (7 m) thick. Grades upsection into interbedded medium to dark gray, algal thrombolitic boundstone interbedded with ribbony, locally fossiliferous, lime wackestone to lime packstone. Several thin, tan dolomite beds occur near the middle of the unit. Thickness: 300 to 400 feet (90–100 m).

Oss — Stoufferstown Member
Dark gray, argillaceous, thinly bedded to ribbony, lime mudstone with thin beds of flat-pebble lime grainstone conglomerate and hummocky, discontinuous, thin beds of laminated limestone. A single, 10-foot (3 m) interval of massive, dark gray, thrombolitic, algal boundstone occurs approximately 30 feet (10 m) above the base of the member. This member weathers into thin, brown and orange chips, which litter overlying soil. Forms a low, discontinuous ridge. Thickness varies from 230 to 295 feet (70–90 m).

Conococheague Formation
Interbedded gray, ribbony limestone and tan dolomite arranged in alternating cycles. Subdivided and mapped as three members, but only the uppermost is exposed in the Mason Dixon Quadrangle. Total thickness of the formation is from 2,000 to 2,500 feet (610–760 m).

Cambrian

Ccu — Upper member
Interbedded medium to light gray, ribbony, lime mudstone that weathers to flaggy or platy beds, and arenaceous grainstone exhibiting edgewise and flat-pebble conglomerates. Locally, thin, pastel blue and pink marble strata are developed. Black or gray chert fragments and brown-weathering quartz sandstone cobbles are frequently abundant in overlying soil. Thickness: 650 to 750 feet (200–230 m).

Ccm — Middle member (cross-section only)
Predominantly cyclically bedded, medium to dark gray, thrombolitic limestone and gray, ribbony and laminated limestone and tan, laminated dolomite. Thrombolites range in thickness from 3 to 6 feet (1 to 2 m) within thrombolitic intervals to less than 1 foot (0.3 m) within the ribbony intervals. Several dark gray, oolitic intervals are present in the upper part of this member. Thickness ranges from 1,500 to 1,800 feet (460 to 550 m).

Explanation of Map Symbols

A′ — Cross section line (A)

Contacts
- Geologic contacts; approximately located dotted where concealed

Planar Features
- Inclined bedding — strike and degree of dip shown
- Vertical bedding — strike shown
- Horizontal bedding
- Overturned bedding — strike and degree of dip shown
- Inclined cleavage — strike and degree of dip shown
- Vertical cleavage — strike shown
- Inclined joint — strike and degree of dip shown
- Vertical joint — strike shown

Faults
- High angle reverse fault (rectangles on upthrown side)
- Thrust fault (sawteeth on upthrown block)
- Generic high angle fault (D Downthrown side, U Upthrown side)
- Fault concealed

Folds
- Minor syncline — bearing and degree of plunge shown
- Minor anticline — bearing and degree of plunge shown

Karst Features
- Spring
- Closed depression
- Sinkhole

Base Map Symbols

Transportation
- Primary route, class 1 (divided, lanes separated)
- Primary route, class 1 (undivided)
- Secondary route, class 2
- Light duty road or street, class 3

Topography
- Topographic index contour (100- ft interval)
- Topographic intermediate contour (20-ft interval)

Hydrography
- Stream
- Water body (eg. lakes, ponds, rivers)